

High Power Transmitter Technologies for Ultra Wideband Multi-Function RF Operation

Completed Technology Project (2012 - 2016)



Project Introduction

This proposal is for the investigation of combining advanced CMOS technology with gallium nitride (GaN) technology to achieve a wholly-digital to high-power RF transmitter system. This unique architecture will eliminate the classical RF-front-end approach by combining the power amplification stage with mixers to create the required output power and frequency of operation. The successful development of this transformative technology will significantly improve the SWAP (size, weight, & power) parameters for future transmitter systems. This research offers many benefits and addresses many of the major challenges NASA has set forth in its communication and navigation system roadmap. First, this system will be waveform agnostic and frequency agile, which will allow for the integration of multiple systems like radar and communications, as well as more efficient use of the RF spectrum. Second, this entirely digital, direct-synthesis approach will allow for the system to be reconfigured via software, thus allowing easy upgradability to support new modes of operation without an expensive hardware overhaul.

Anticipated Benefits

The successful development of this transformative technology will significantly improve the SWAP (size, weight, & power) parameters for future transmitter systems. This research offers many benefits and addresses many of the major challenges NASA has set forth in its communication and navigation system roadmap. First, this system will be waveform agnostic and frequency agile, which will allow for the integration of multiple systems like radar and communications, as well as more efficient use of the RF spectrum. Second, this entirely digital, direct-synthesis approach will allow for the system to be reconfigured via software, thus allowing easy upgradability to support new modes of operation without an expensive hardware overhaul.



Project Image High Power Transmitter Technologies for Ultra Wideband Multi-Function RF Operation

Table of Contents

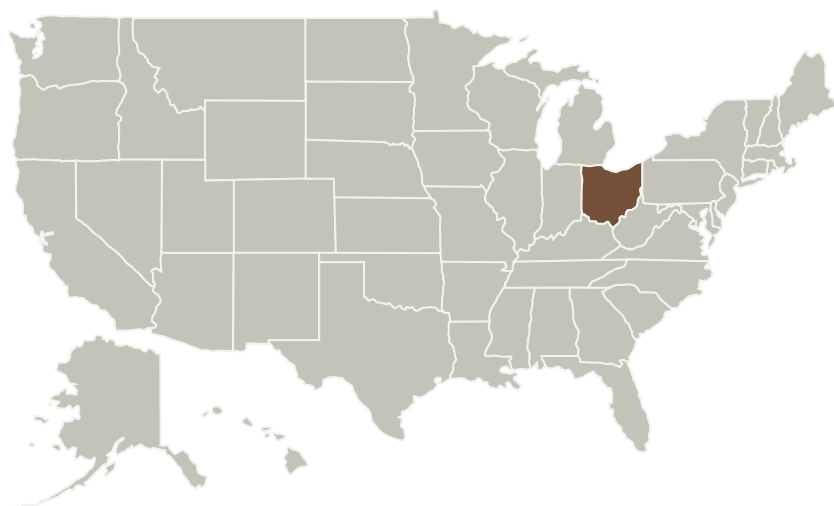
| | |
|--|---|
| Project Introduction | 1 |
| Anticipated Benefits | 1 |
| Primary U.S. Work Locations and Key Partners | 2 |
| Organizational Responsibility | 2 |
| Project Management | 2 |
| Images | 3 |
| Project Website: | 3 |
| Technology Maturity (TRL) | 3 |
| Technology Areas | 3 |

High Power Transmitter Technologies for Ultra Wideband Multi-Function RF Operation

Completed Technology Project (2012 - 2016)



Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|-----------------------------------|-------------------|----------|----------------|
| Ohio State University-Main Campus | Lead Organization | Academia | Columbus, Ohio |

| Primary U.S. Work Locations |
|-----------------------------|
| Ohio |

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Ohio State University-Main Campus

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

Waleed Khalil

Co-Investigator:

Matthew R Larue

High Power Transmitter Technologies for Ultra Wideband Multi-Function RF Operation

Completed Technology Project (2012 - 2016)



Images



11519-1363185394143.jpg

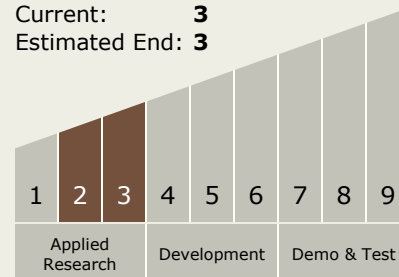
Project Image High Power
Transmitter Technologies for Ultra
Wideband Multi-Function RF
Operation
(<https://techport.nasa.gov/image/1772>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves